REMARKS/ARGUMENTS

Claims 2-20 are currently pending for examination. Claim 1 has been cancelled. Claims 2 and 9 are presently amended. No new matter has been added.

Rejection of Claims 9-13 under 35 U.S.C. 112

Claims 9-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 9 has been amended to correct any insufficient antecedent basis problems with the prior claim. Claims 10-13 depend from claim 9 and should be allowed for the same reason. Withdrawal of the rejection is respectfully requested.

Rejection of Claims 1-20 under 35 U.S.C. 103(a)

Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Nielson et al. ('189) or Kale ('640) taken in view of Smedley ('274). The Office Action provides:

> "Both Nielsen et al. and Kale disclose a system for engaging a clutch in accordance with clutch input and output speeds. Neither Nielsen et al. nor Kale appear to disclose the claimed step of determining the starting condition based on information stored in the memory relating to when the clutch first began to carry torque during the prior engagements of the clutch, as called for in claim 1. Smedley discloses a clutch control arrangement wherein the point where the clutch first begins to carry torque (the touch point) is determined and stored in memory. This stored touch point is used is subsequent clutch engagements. It would have been obvious to store and retrieve values from previous engagements in the Nielsen et al. or Kale devices, the motivation being to provide consistent clutch engagement throughout the clutch life independent of clutch wear. The determined and stored clutch point is readable as the "previous condition" called for in claim 9. Both Nielsen et al. and Kale teach sensing the speed of the power source (sensor 24) and the speed of the output (sensor 26). The Smedley control arrangement involves altering the rate of engagement in subsequent engagement steps. Since the touch point is determined and stored at each engagement, calibration is based on several previous engagements, including four previous engagements."

Applicant respectfully submits that to establish a *prima facie* case of obviousness, three criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a

reasonable expectation of success. Finally, the applied reference must teach or suggest all the claim limitations (See MPEP §2143).

Nielson appears to teach an apparatus and method for controlling engagement of a PTO shaft. The control circuit taught modulates clutch engagement by continuously determining an actual acceleration of the PTO based upon the sensed angular velocity of the output shaft and then generates control signals based upon the difference between the actual acceleration and a desired acceleration of the PTO. Nielson does not teach a method of determining a start point for PTO clutch engagement (Claim 2 in part claims "determining a starting control signal value for controlling the clutch engagement pressure based at least in part on information stored in the memory relating to when the clutch first began to carry torque during at least one prior engagement of the clutch) but instead appears to assume a fixed start point for all PTO clutch engagements. In actual use, the start point will be quite different from clutch to clutch and also will change as external load (which occurs almost constantly with a PTO driven implement) or oil temperature changes. By using PTO shaft acceleration as the only reference for deciding the control command, the method taught by Nielson cannot accommodate for external load changes. As a result, in very heavy load conditions, this strategy can cause engine stalling, and in very light conditions, this strategy can cause abrupt engagement. Unlike Nielson, the present invention teaches determining a touch point. The present invention as claimed in Claim 2, uses both engine speed droop, "the sensed speed representative of the speed of the power source is more than a predetermined amount less than the initial rotational speed", as well as PTO shaft acceleration, "the PTO output begins to rotate", as references in determining a starting point as well as "information stored in memory relating to when the clutch first began to carry torque during at least one prior engagement of the clutch." The present invention allows for smooth PTO operations under extreme varying external load conditions unlike the method taught by Nielson.

Kale appears to teach primarily the very limited application of controlling clutch engagement when a dead locked PTO shaft instance occurs. The strategy taught by Kale determines such a dead locked situation has occurred when it is detected that the input shaft speed has decreased by a predetermined amount and the output shaft speed is substantially zero. When such a situation is detected, a maximum control current is sent to the clutch. Most dead locked loads are very heavy loads and the maximum control current (which would

abruptly fully engage the clutch) will most likely stall the engine, if not break the PTO shaft. The method taught by Kale would most likely result in the operator having to restart the engine and conduct the same operation numerous times to break the dead lock loose. Like Nielson, Kale also fails to teach a method of determining a start point for PTO clutch engagement as well as lacks using information of a previous clutch engagement stored in memory.

To account for the deficiencies of both Nielson and Kale, the Examiner relies upon the cited reference of Smedley. Smedley appears to teach an automatic clutch controller for use in the control of a drive train of a motor vehicle, especially the drive train of a large truck. The clutch described connects components within the vehicle (engine and transmission). The invention taught by Smedley requires the vehicle to have a stable engine speed as the touch point is determined while idling the engine, with the transmission in neutral and an input shaft brake applied (col. 2, lines 13-15). Such limitations make the method taught by Smedley inapplicable to the application taught by the present invention as vehicles equipped with a PTO as described in the present application most times have user-variable idle and operating speeds (both engine and ground speed can also be independently selected) as well as PTO shafts which can be engaged on the fly (while the vehicle is in motion). The touch point determined by Smedley is selected as that degree of engagement which allows a small fixed brake torque to be overcome to drive the transmission input shaft to a reference speed (col. 3, lines 40-43).

Applicant respectfully submits that there is no motivation to combine the teaching of Smedley with that of either Nielsen nor Kale as the starting requirements for the method taught by Smedley (as described above) are not applicable to the usage environment of Nielson, Kale, or that of the present invention where the clutch is being used to engage an external PTO shaft. For this same reason, even if such a combination of teachings was contemplated there would not be a reasonable expectation of success.

The method of determining the touch point taught by Smedley would fail to work if the idle speed of the vehicle was variable or if the vehicle were in motion as is common with the work vehicle described in the present application. By "determining an initial rotational speed of the power source under a zero torque transmission of the clutch" the presently claimed invention can readily adapt to various engine speeds both when the vehicle is moving

or parked which allows for smooth engagement of PTO connected implements under varied conditions such as when the vehicle is parked at a low user set idle, parked at a high user set idle, as well as moving at a user determined vehicle speed and user determined engine speed (all possible and common conditions in which the present invention would be utilized). Additionally, the method taught by Smedley deals with known loading conditions on the clutch as the set-up taught only deals with a clutch connecting known components (the idling engine to the vehicle transmission). By "sensing rotational speeds representative of the speed of the power source and of the output, respectively, as the control signal value is increased from the starting value and comparing the sensed rotational speeds representative of the speed of the power source with the initial rotational speed of the power source, and storing information representative of the control signal value in the memory for use in step (a) for a subsequent engagement of the clutch" the presently claimed invention allows for smooth clutch engagement regardless of the external unknown load condition applied to the PTO shaft. Applying such starting requirements as taught by Smedley in a usage environment of the present invention would reduce the utility of such a vehicle in a most undesirable manner.

The present application deals primarily with determining a starting control point for a clutch connecting a vehicle with external implements (power take off, PTO). Drop in engine rpms or input speed (also referred to as engine droop) along with output speed are used in determining the starting point. No other reference is needed and the calibration will adapt to any external load changes, a necessary feature as different implements as well as changing use conditions will greatly affect the load seen by a PTO.

As described above, the strict initial requirements of the method taught by Smedley would discourage one from combining such teachings with either of the references of Nielsen or Kale and would not produce a reasonable expectation of success in combination with either of those references. Additionally, in having such strict initial conditions as discussed above, the cited reference of Smedley fails to disclose or teach all of the elements of the rejected claims as indicated above. For at least these reasons, Claims 2-20 should be allowed over the cited prior art. Withdrawal of the rejection is requested.

A fee of $120 is believed due in connection with this Amendment for a one month extension. Form PTO/SB/22, Petition for Extension of Time Under 37 CFR 1.136(a) is

attached. If the Commissioner determines that any additional fee is due, he is authorized to charge the fee to Deposit Account No. 14-0780.

In view of the above remarks, it is believed that the application is in condition for allowance. Accordingly, an early Notice of Allowance is respectfully requested.

Respectfully submitted,

Stephen A. Bucchianeri
Attorney for Applicant(s)
Reg. No. 54, 928
Date: January 17, 2006

(717) 355-4954 Phone
(717) 355-3107 Fax